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LPU-21/P LIFE PRESERVER CASING MATERIAL PROGRAM

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Aramid Plain Weave, Life Preserver	Helicopter Life Preserver							
Aramid Twill, Life Preserver	Life Preserver							
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<p>LPU-21/P Life Preserver Casings manufactured from High Temperature Aramid Cloth (MIL-C-81814) has a tendency to unravel at edges, making manufacture difficult with seam separation. A new Aramid Plain Weave Cloth (MIL-C-83429) does not unravel as easily. A number of preservers were manufactured from the new cloth and were given a special evaluation by operational squadrons. The casings withstood wear well and the new material would eliminate most of the raveling and seam separation problems.</p>								

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INTRODUCTION

BACKGROUND

The present LPU-21/P Life Preserver Casing is manufactured from MIL-C-81814, High Temperature Resistant Aramid Twill Cloth. This particular form of NOMEX has a tendency to unravel at its edges, making a casing very difficult to manufacture and sewn seams separate after manufacture because of this unraveling. A number of preservers were manufactured from MIL-C-83429, Aramid Polyamide Non-Melting Plain Weave Cloth for a special evaluation by operational squadrons. This cloth does not unravel as easily as the filament fabric. Helicopter crews were given these life preservers and were asked to fill out questionnaires evaluating the new casings.

This program was authorized by the Naval Air Systems Command and had a priority listing on the "NAVAIR ALSS/ILS/AMP TASK/PRIORITY LIST" with a priority of II A-9 titled "Nomex cases on LPU-21/P life preservers unravel and separate at the seams."

DESCRIPTION

The original LPU-21/P Life Preserver Casings are manufactured from MIL-C-81814 cloth (figure (1)). The new casing material is MIL-C-82429 (figure (2)). A comparison of some differing properties is given in table I. Casings were manufactured to the same design as that for the LPU-21/P using the new material.

TEST PROCEDURE

Forty-three complete life preservers were forwarded to Helicopter Anti-Submarine Squadron ONE, Naval Air Station, Jacksonville, FL. Questionnaires were forwarded to the squadron to be filled out by wearers of the life jackets. The questionnaire is shown in appendix A.

RESULTS AND DISCUSSION

GENERAL

Fifty-six percent of the questionnaires were answered, all by pilots. Results of the questionnaires are summarized in appendix B.

CONDITIONS OF WEAR

The preservers were worn by pilots who were between 5 ft. 8 in. at 135 lb. and 6 ft. 3 in. at 200 lb. (The pilots had between 300 and 3200 hours of flying time in their careers with an average of 1938 hours). The preservers were worn during regular flight duties for between 20 and 150 hours with an average of 64 hours of wear.

WEAR

In general, the casings withstood wear very well. Seams separated in 16% of the preservers (84% showed no separation). Pilling occurred only in 5% of the preservers and fading or silk screening rubbing off occurred in only 5% of the preservers. Bindings pulled off in 9% of the preservers with 91% showing no damage.

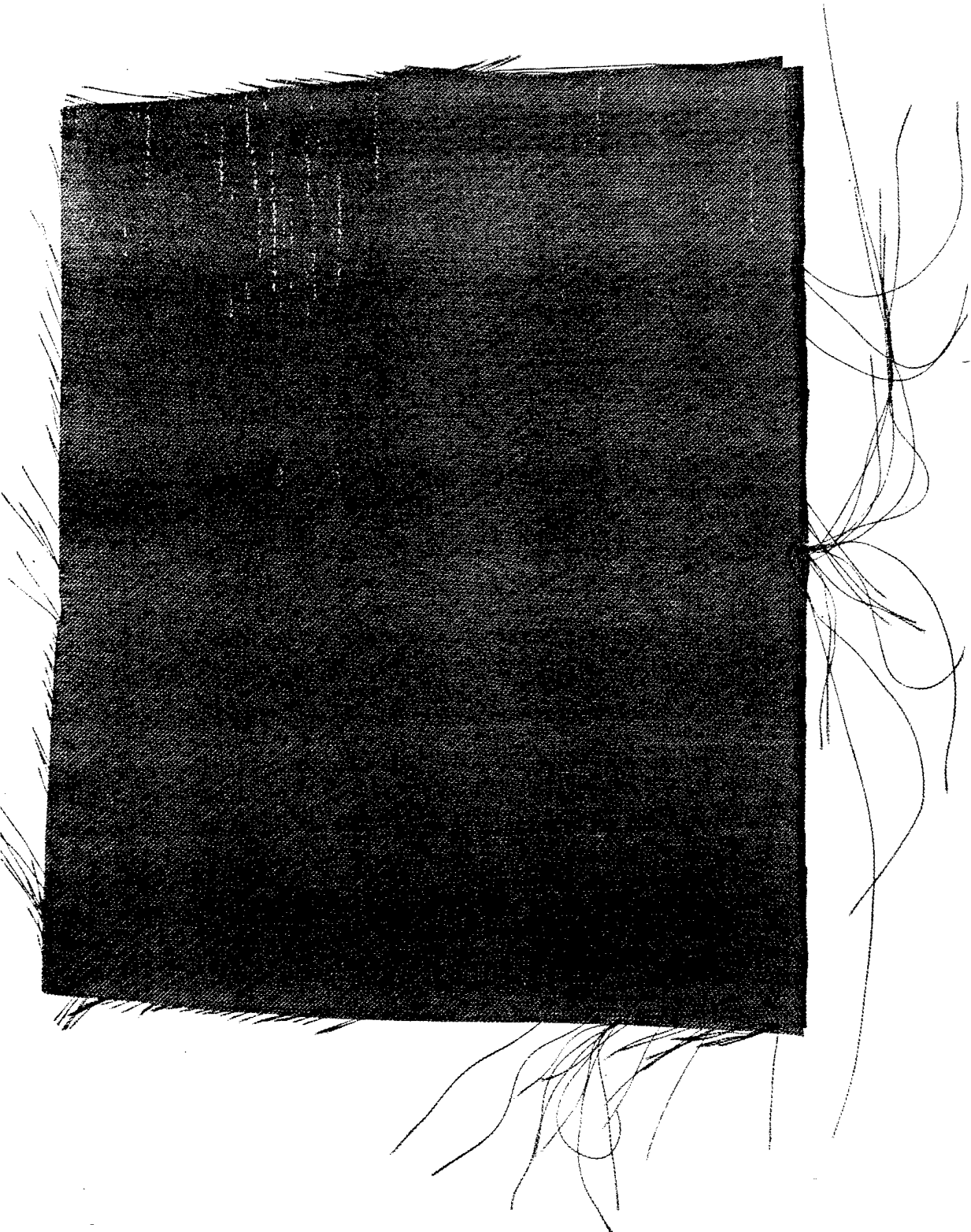


Figure 1 — MIL-C-81814 100% Nomex Aramid

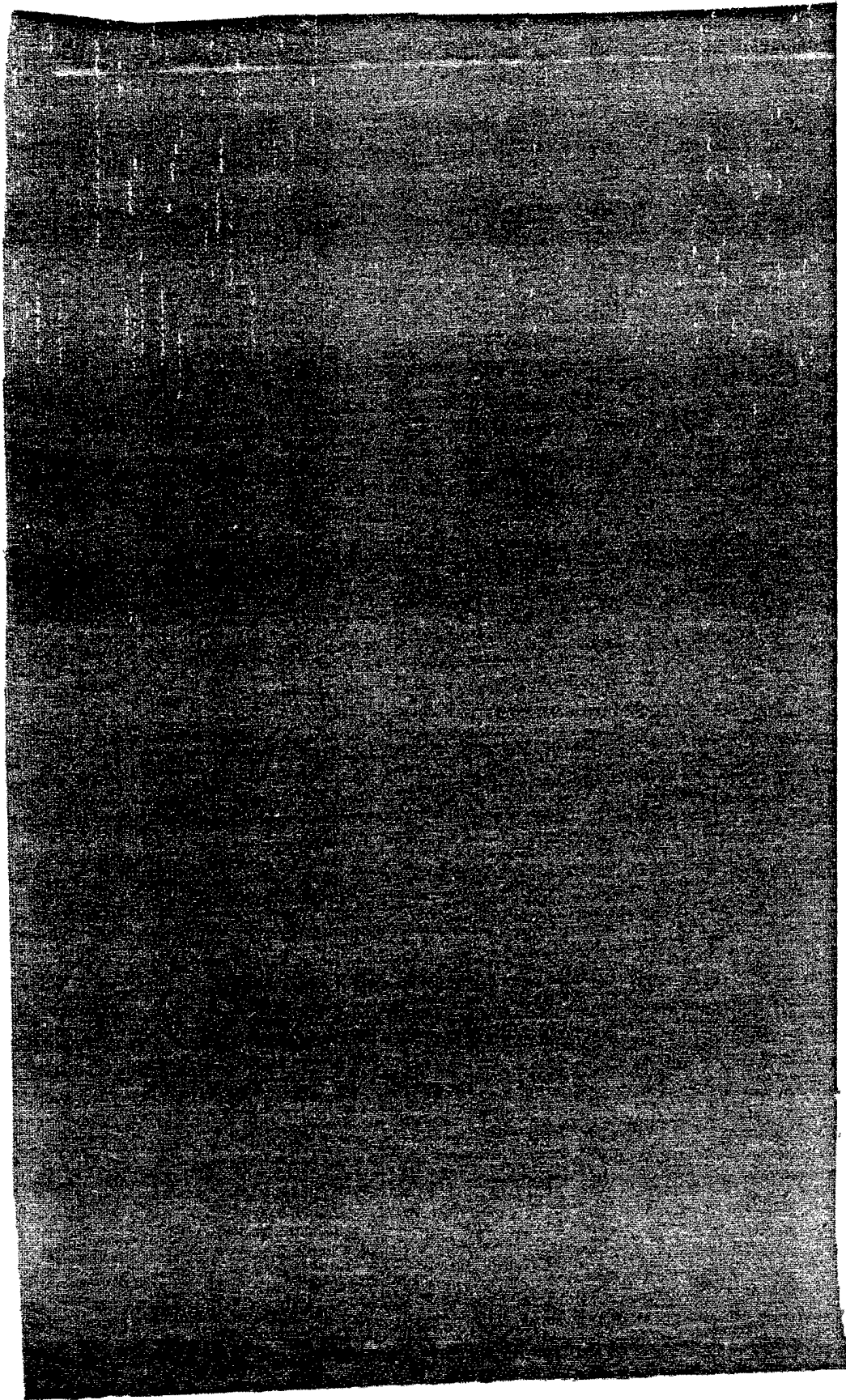


Figure 2 — MIL-C-83429 (Type II Class 1) 95% Nomex, 5% Kevlar

TABLE 1 — COMPARISON OF MATERIAL PROPERTIES

	MIL-C-81814 "Cloth, Twill, Aramid, High Temperature Resistant"	MIL-C-83429 Type II Class I "Cloth, Plain and Basket Weave, Aramatic Polyamide Non-Melting"
Fiber	"Nomex" High Temp. Aramid, 200 Denier filament	95% Nomex, 5% Kevlar Non-melt Aromatic polyamide staple
Weave	2/2 right hand twill	Plain
Weight (oz/yd ²)	5.2-5.6	4.3
Yarns/inch	98	70
Warp	90	47
Denier/filament	2	1.5
Breaking strength (lb.)		
Warp	185	180
Fill	160	100
Tear strength (lb)		
Warp	13	12
Fill	13	8
Air Permeability (ft ³ /min/ft ²)	12	25
Flame Resistance		
Flame Time (Sec)	1	2
Glow Time (Sec.)	14	25
Char Length (in.)	3.5	3.5
Stability after laundering (Max. shrinkage in %)		
Warp	2	4
Fill	2	1.5

MAINTENANCE

No maintenance problems were encountered.

STOWAGE

About half of the pilots (52%) encountered problems in repacking the preserver in its casing. The bladder pushed out at the neck by opening up of the velcro. However, this problem was not caused by the new material; the tightness of the casing at the neck is part of the original LPU-21/P design.

OVERALL PERFORMANCE

Ratings were split at 1/3 each for "Very Good", "Good" and "Adequate".

GENERAL COMMENTS

About one-third of the questionnaires included "Comments". These were all favorable with regard to the new material.

CONCLUSIONS

In general, the new MIL-C-83429 material may be considered satisfactory for manufacture of LPU-21/P life preserver casings. It would eliminate the raveling and seam separation problems which occur with MIL-C-81814.

The problem with neck separation of the casing which allows the bladder to push out must be addressed by a minimal redesign of the casing.

APPENDIX A

EVALUATION FORM

LPU-21/P AIRCREWMEN LIFE PRESERVER CASING FABRICATED WITH
MIL-C-83429, TYPE II, CLASS 1 CLOTH (CONTRACT NO. N00383-80-C-4391)

INTRODUCTION

The LPU-21/P Life Preservers fabricated with MIL-C-83429 Type II Class 1 cloth have been produced to evaluate an alternative cloth to the MIL-C-81814 aramid cloth which is currently specified for use in the casing.

PURPOSE

The purpose of this evaluation is to collect data on user acceptance and operational suitability of LPU-21/P life preserver casings fabricated with MIL-C-83429 cloth. This information will be used to determine the suitability of this cloth for future procurements of life preserver casings. Your contribution to this evaluation is both important and appreciated. When you have completed this evaluation form, please return to:

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1. Name and Rank _____ 2. Date _____

3. Organization/Squadron _____

4. Aircraft Type _____

5. Height _____ 6. Weight _____

7. Crew Position:

Pilot _____ Co-Pilot _____ RIO/NFO _____ Other _____

8. Your approximate total flight hours _____

9. Approximate total hours the evaluation item was worn _____

10. Describe the overall performance of the life preserver during flight.

Very good _____ Good _____ Adequate _____ Poor _____ Very Poor _____

11. Were any of the following failures observed during the evaluation period?

Seam Separation Yes _____ No _____

Excessive Pilling Yes _____ No _____

Pulling off of Bindings Yes _____ No _____

Fading or Rub-off of
Silk Screened Information Yes _____ No _____

Comments: _____

12. Were there any maintenance problems during use? Yes _____ No _____

If so, describe _____

13. Did you observe any problems with the stowage of the life preserver in the casing?
 Yes _____ No _____

If so, describe _____

14. Overall Comments or Recommendations: _____

APPENDIX B

PILOT EVALUATIONS FOR USE OF LPU-21/P
LIFE PRESERVER CASING MATERIAL, MIL-C-83429 (Type II Class 1)
(SH-3 PILOTS IN HS-1)

PILOTS: 5 ft. 8 in./135 lb. to 6 ft. 3 in./200 lb.

Total Flight Hours: 300-3200; Average — 1938
Hours LPU-21/P Worn: 20-140; Average — 64

*OVERALL PERFORMANCE RATINGS: Adequate — 33%
Good — 33%
Very Good — 33%

*WEAR:

Seam Separation	No — 84%	Yes — 16%
Excess Pilling	No — 95%	Yes — 5%
Pulling Off Binding	No — 91%	Yes — 9%
Fading/Silk Screen Rub Off	No — 95%	Yes — 5%

MAINTENANCE PROBLEMS: None.

*STOWAGE PROBLEMS: No — 48%; Yes — 52%

* Figures given are for percentage of respondents answering each question.

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